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THE OSTRICH.

By S. C. CRONWRIGHT SCHREINER.

THE Ostrich, *Struthio camelus*, has been observed with interest from very early times; it has frequently been the subject of remark by African travellers; and it has been domesticated and farmed in the Cape Colony for some thirty years. Yet it is remarkable how little is known about it in scientific circles, and how many misconceptions still prevail as to its nature and habits.*

* This article is founded on personal observations made during nine years of uninterrupted Ostrich-farming in the Karroo of the Cape Colony, and during travels about the country generally. The number of Ostriches which were under my care during this period ranged from about 250 to 450. Some of the birds were the progeny of wild birds, brought down as chicks from further up-country. Every year eight special breeding pairs were camped off, each pair in a separate small camp; but the other birds ran in large camps, the extent of the farm being 4600 morgen (about two acres to the morgen). In these large camps, some of which are a couple of miles in diameter, numbers of birds of both sexes run in what is practically a wild state, seldom interfered with in any way, except when rounded up to be plucked or to be fed in a drought. I know, from personal observation when purchasing wild chicks from the nest, and from numerous inquiries, that the habits of birds thus farmed differ in no way from those of native wild birds, except perhaps that monogamy is more difficult. The whole of the Cape Colony is the native habitat of the Ostrich; there are feral Ostriches in many parts, and wild birds in some of the up-country districts.

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How many Species are there?

I have not been able to ascertain whether the question as to the number of species of Ostrich has yet been settled. Some writers maintain there are two species; others that there are three. Professor Newton (article "Ostrich," 'Encyclopædia Britannica'), after briefly reviewing the evidence, says the question "has been for some years agitated without leading to a satisfactory solution."

The reasons given for classifying the Ostrich into three species are:—

That in the North African bird, *Struthio camelus*, the skin of the unfeathered parts is flesh-coloured; in the South African, *S. australis*, bluish, except at the angle of the gape, which is flesh-coloured; and in the birds of the Somali country, *S. mybdophanes*, leaden coloured.

It is further maintained that the eggs of the northern Ostrich are larger than those of the southern, and have a perfectly smooth surface, while those of the southern are punctured or pitted; also that the northern bird is the smaller, and the cock not so jet-black. Mr. Bartlett adds, as another distinguishing character, that in the southern Ostrich the scales of the tarsi and toes, unlike the skin of the other unfeathered parts, are flesh-coloured.

If the question has not been settled, a short description of the South African Ostrich may help towards its solution; if it is decided, the description may nevertheless convey some useful information to such as are interested in it.

Colour of the Plumage.

Chicks when first hatched, and for some weeks after, have the wings and upper part of the body covered with a mottled dark-and-white coat of small feathers, ending in solid spiked points, almost like miniature porcupine quills; the lower part with a soft yellow down. The neck is marked longitudinally with wide dark stripes on a lighter ground, and the head with spots of the same colour. Some broods are much darker than others. They soon acquire a plumage varying from ash-colour to brown, the feathers retaining their spiked points for some time. At an age, generally from about twelve to eighteen months,



chicks begin to moult their youthful plumage of narrow pointed feathers, and gradually acquire those of the adult bird, possessing them in their entirety, at the latest, when about four years old. Up to the time when the change begins, the sexes are not distinguishable; but after the moult the cocks acquire a black and the hens a drab plumage, which differs from that of a big chick not so much in colour as in the shape and quality of the feathers. The cocks do not change abruptly from their youthful drab to adult black, but pass through what is generally designated by the Dutch word, the "bont" (variegated) stage. Black, brown, and drab feathers are indiscriminately mingled all over the body, the plumes and tails being black-and-white. The same stage is gone through by the hens, but is not nearly so conspicuous, the difference in the colour of the feathers being less marked. At about four years all have their adult plumage; but both among cocks and hens there is a great diversity in colour in different individuals and in different parts of the country. In all cocks the plumes ("whites") are white, but in hens these feathers ("feminas") vary from white to drab. The "tails" correspond in colour with the "whites" and "feminas," respectively. In both sexes, variations in body-colour are most conspicuous. Some cocks are a glittering jet-black, while others are a rusty-brown; a few have odd white feathers dotted about the body; occasionally the secondary wing-feathers are white, or often fringed with white; and I knew of one which was thickly flecked with white over the whole body. In some cocks all the feathers, "whites" excepted, are beautifully curled, almost as though artificially; while in others they have not the slightest indication of curl. These individual variations are in some cases accentuated by differences of climate. Towards the coast the rusty-brown tint (more pronounced than up-country) is often found, while the glittering jet-black, so characteristic of Karroo birds, is comparatively uncommon. On the authority of an Ostrich farmer of great experience, who has hundreds of birds on both Karroo and coast farms, Karroo birds produce, on the whole, the best "blacks," coast birds the best "whites." The first essentiality of black feathers is that they shall be glittering and glossy, and this condition the dry air of the Karroo seems to favour; a white feather must, other characteristics being equal, be soft, with a limp

quill, and this seems to be most frequently produced by the damp coast breezes. Hens also vary in body-colour to an equal extent, though, in their case, the differences are not very conspicuous, the colours not being so strongly contrasted. They range from a dark rich brown to light brown, grey, or ash. I have had several hens with each feather ("feminas" excepted) barred across with white at about a quarter of its length from the tip, and one which had the perfect black plumage of a cock.

Colour of the Unfeathered Parts.

The colour of the unfeathered parts of chicks is yellow, which gradually changes to flesh-colour, and, as the adult stage is reached, either remains flesh-coloured, though of not so pronounced a tint, or changes to bluish or leaden—nearly always bluish. Variations not only in colour, but in texture, thickness, and strength of the skin, are both great and frequent. The colour of the neck varies also, in both sexes, from dark—nearly black in the case of the cock and deep brown in the hen—to almost white. The colour of the eye even varies; generally it is brown, but grey is not unknown.

Colour of the Tarsi and Toes.

Chicks* may be divided into two lots, of about equal number, by the colour of the scales of the tarsi and toes. Some have light brown scales, the others dark brown. There is no grading from one tint to another; the line of demarcation is clear and unmistakable. The dark-scaled are by some farmers said to be cocks, the light-scaled hens. My attention was only drawn to this peculiarity shortly before retiring from Ostrich-farming; I cannot therefore express a decided opinion, not having had an opportunity of testing whether the statement is correct.

At any rate, the scales of the hens invariably remain brown, but those of the cocks change to flesh-colour, varying from nearly white to brilliant crimson. Cocks' legs do not often lose all trace of the crimson tint, though its intensity varies with the seasons, being brightest in a fat bird in the height of his sexual vigour in the breeding season, and faintest when a bird is in a

* The term chick is often used for a bird of as much as even three years old.

low condition in the winter. It also varies in individual birds, and with their condition, and becomes pale during the period of sitting. During the non-breeding season the colouration, more or less faded, is nearly always confined to the scales of the tarsi; but in all cocks that "come on" during the breeding season it is seldom, if ever, so confined, the tarsi themselves, the toes, and the beak, to a greater or less extent, also becoming affected. Some cocks are then most brilliantly coloured; not only do the toes and the whole of the tarsi become a brilliant crimson, but the upper part of the leg (called by the Cape Ostrich farmers the "thigh") for half its length, nearly the whole of the head, especially the beak, ears, and around the eyes, are of the same gaudy tint. A vicious cock in full plumage is then a beautiful and imposing creature; the glittering glossy black is strikingly contrasted with the spotless white of his waving plumes, and the bright crimson of his head and legs; and as, with springy steps, he advances to battle, angrily lashing his wings across his raised body, with tail and neck erect, and flashing eyes, he is not only a beautiful, but a grand, and, to many a man, a terrifying object.

No corresponding changes take place in the hen; neither does she become vicious, except when she has chicks.

The Egg; and Size of Ostriches.

As to the alleged difference in the shell of the eggs of the northern and southern Ostrich, it may be sufficient to remark that the eggs of the southern bird vary frequently and greatly in respect of size, shape, and shell; some are quite a third larger than others; some are almost spherical, others oblong; and the shells vary from being deeply and thickly pitted to smooth and polished.

Differences in the sizes of Ostriches are equally marked; there is no uniformity. Some birds are very much larger than others; they also differ considerably in shape.

Only one Species.

It will thus be seen that all the differences on which the arguments for classifying the Ostrich into three species are founded, are commonly present among the Ostriches of the Cape Colony—that is, of South Africa generally; for a great many of

the Cape Ostriches are the progeny of birds brought down from "The Interior"—the Kalahari Desert, Damaraland, and beyond. There is, I think, little doubt that all South African Ostriches are of one species; individual variations, accentuated by local differences of food and climate, are quite sufficient to account for all supposed varieties. I do not think that, on the evidence which I have been able to gather, there is any justification for maintaining that there is more than one species of Ostrich.

The Egg and Flesh of the Ostrich.

The Ostrich hen lays every other day, and the egg weighs about three pounds; it is a tasty and nutritious food however prepared, very rich, and excellent for making pastry and cakes. It is generally computed to be equal to two dozen fowls' eggs; but this must be on account of its superior richness, for, from personal experiment, the empty shell of a fairly large one exactly held the contents of eighteen fowls' eggs. It takes about forty minutes to boil an Ostrich egg hard. The period of incubation is about six weeks. The flesh of the chick, if well prepared, is excellent, but that of an old bird is tough and insipid. The Ostrich is, however, never killed for food, and is very rarely eaten, except by native servants.

Its Breast-bone and Powers of Kicking.

The breast-bone of the Ostrich is of great thickness and strength, and of course keelless. Its lower edge has a hard pad, which must be useful to this heavy, long-legged bird when it bumps down to the recumbent position. It is obvious that the great weight and speed of the Ostrich, and its liability to collide against objects on the ground over which, when frightened, it makes its headlong indiscriminate way, would need that it be protected in front. Its thick convex sternum, almost devoid of flesh, is a most effective safeguard. As an instance of this, I have seen an Ostrich, at great speed, run against and snap a No. 6 fencing-wire, striking it with its breast; in the same way I have seen a sneeze-wood pole (a very tough wood used in wire-fencing), four inches in diameter at its thinnest end, broken just where it emerged from the ground; and a chick about eighteen months old run against a loose badly-built stone wall two feet in

thickness, and break a gap through it;—all these without injury to the birds. The shape and strength of the breast-bone is also a protection to fighting cocks, for the most powerfully delivered kicks nearly always strike there, doing but little harm.

During the breeding season cocks often fight, but, unless they kick at each other through a wire-fence (when a broken leg frequently occurs), seldom with fatal results. The kick is forward with a downward tendency, and the long nail with which the larger toe is armed often cuts and tears severely. The force of the kick is great; a man goes down before it like a nine-pin. I have seen two cocks charge at each other, the larger of the two, at the first kick, being hurled several yards on to the broad of his back, while the kicker recoiled into a sitting posture; and I possessed a cock which kicked a hole through a sheet of corrugated iron, behind which a man had taken refuge. They can kick as high as a man's face; I have had a hole kicked through my riding breeches above the knee, and have known a boy kicked out of the saddle. Deaths from Ostrich kicks are by no means unknown. A really vicious cock seems to fear nothing, unless it be a dog that will attack him. The most striking instance of their fearlessness which I have heard was told me by a railway guard. The goods train he was in charge of was one day rattling at full speed down a steep gradient. A vicious cock saw it coming, and at once got on to the line between the rails, and advanced fearlessly to fight the monster. As the screeching engine approached, he rushed at it from straight in front, hissing angrily, and kicked. He was cut to pieces the next moment.

Leaping and Swimming.

The old idea that an Ostrich can only leap over a very low fence, or across but the narrowest sluit (gully), is incorrect. It is true that perfectly tame birds, grazed within well-defined boundaries, may often be kept there with very insecure fences when the birds are thoroughly accustomed to recognize such as boundaries; but they will, when startled (never deliberately), sometimes go over a six-strand wire fence nearly five feet high, putting one foot on one of the middle wires, and striding over with the other. They will go over a stone wall in the same manner, if too high for them to step upon; and I have seen a

cock take a standing jump on to the top of a wall five feet high, beyond which were his chicks. When accustomed to run in cut-up veld they become very clever at leaping across sluits. They do not stride over, but, coming almost to a standstill at the edge of each sluit, jump with both feet, often alighting on one foot and striding on at once with the other, like a good steeplechaser.

Even as a chick the Ostrich is a powerful swimmer. I have known several birds swim some distance down the Great Fish River when it was running fairly strong, and have heard, on what seems trustworthy evidence, of a cock that was carried a long way down the same river when it was running nearly level with its precipitous banks in the stormy season; he was some hours in the water before he could get out, but emerged unhurt.

Waltzing and Rolling.

All Ostriches, adults as well as chicks, have a strange habit known as "waltzing." When chicks are let out from a kraal in the early morning they will often start away at a great pace. After running for a few hundred yards they will all stop, and, with raised wings, spin round rapidly for some time, often until quite giddy, when a broken leg occasionally occurs. Adult birds, when running in large camps, will often, if the veld is good, do the same, especially if startled in the fresh of the early morning. A troop of birds waltzing, in full plumage, is a remarkably pretty sight.

Vicious cocks "roll" when challenging to fight, or when wooing the hen. The cock will suddenly bump down on to his "knees" (the ankle-joint), open his wings, making a straight line across his breast, and then swing them alternately backward and forward (keeping the line straight) as if on a pivot, each wing as it comes forward being raised while that going backward is depressed. The neck is lowered until the head is on a level with the back, and the head and neck swing from side to side with the wings, the back of the head striking with a loud click against the ribs, first on the one side and then on the other. The click is produced by the skin of the neck, which then bulges loosely just under the beak, and for some distance downwards. While rolling, every feather over the whole body is on end, and the plumes are open, like a large white fan. At such a time the bird sees very

imperfectly, if at all; in fact, he seems so preoccupied that, if pursued, one may often approach unnoticed. I have walked up to a rolling cock and seized him by the neck, much to his surprise. Just before rolling, a cock, especially if courting the hen, will often run slowly and daintily on the points of his toes, with neck slightly inflated, upright and rigid, the tail half-drooped, and all his body feathers fluffed up; the wings raised and expanded, the inside edges touching the sides of the neck for nearly the whole of its length, and the plumes showing separately, like an open fan, flat to the front, on each side of his head. In no other attitude is the splendid beauty of his plumage displayed to such advantage.

The Cry of the Ostrich.

The cry of the Ostrich is very correctly described as a "boom." (The word in use among all Ostrich farmers at the Cape is the Dutch verb "brom"; in English, an Ostrich "broms," or is "bromming.") This cry is confined to the cock. It is uttered spontaneously sometimes, especially at night; but generally it is a challenge to another cock to fight, or a note of courting to the hen. It can only be uttered while the bird is standing still. It is a peculiar muffled round sound, very difficult to locate exactly, and conveys the impression that, if it had free vent, it would become a loud roar. It is made by the bird calling, without allowing any air to escape. Each cry consists of three "booms," two short followed by one long, the bird just catching its breath after each note. As no air escapes, the neck becomes greatly inflated during each "boom," in the third to a remarkable extent. This cry may be repeatedly uttered. At night it sounds weird and wild. A faint yet close imitation may be produced by a person closing his lips tight, and attempting to utter two rather short "boos" with an interval of about a second after each, and then one long one, allowing the breath to come into the mouth, but not to escape. The cheeks will become distended just as the neck of the Ostrich does.

There are other sounds common to both sexes—an angry hiss, a subdued guttural gurgle (uttered occasionally when much frightened), and a short sharp note, generally an alarm signal. There is also the penetrating plaintive call of chicks of all ages, a liquid, tremulous, treble cry.

How it Feeds, and what it will Swallow.

The Ostrich feeds in a peculiar manner. It tosses the food into a sack in the upper part of the neck, and then swallows it. I have seen a bird toss fully a quart of mealies (Indian corn) into this sack before swallowing; and it is no uncommon thing to see two "swallows" travelling down the neck at the same time with a clear interval between them; or to see one of them (if of large and loose food, *e. g.* grain) slide back into the sack after being swallowed, if the bird lowers its head to continue feeding before the food has travelled some considerable distance down the neck. The food travels slowly, and performs a complete circuit of the neck before reaching the crop. Crushed bones are greedily eaten; if too large a piece should stick in the neck, it is a simple matter to cut it out and sew the wound up again. The wound, as a rule, heals quickly, and causes but little inconvenience.

As is well known, Ostriches will swallow almost anything small enough to pass down the neck. I have either known them swallow, or have heard of them swallowing, and on evidence which I believe, such things as oranges, small tortoises, fowl and turkey chickens, and kittens! I found a cock in my dining-room on one occasion rapidly demolishing, one after another, the contents of a box of luscious peaches. Some friends were playing tennis with only one ball. A rather vigorous drive sent it beyond the tennis-ground, close to an Ostrich hen; she at once swallowed it with evident relish, and brought the game to a sudden end! A cock swallowed several yards of fencing-wire in short pieces, and about half a dozen brass cartridges. These were found in his crop, and had killed him. He had followed the fencers, swallowing the ends of the wires as filed off! An Ostrich's crop always contains a large quantity of smooth stones, many of them brightly coloured.

How the Ostrich runs.

Considerable misconception prevails as to the manner in which the Ostrich runs. It seems to be still generally held that, when running, it spreads out its wings, and, aided by them, skims lightly over the ground. This is not correct.

When a bird really settles itself to run it holds its head lower than usual, and a little forward, with a deep loop in the

neck. The neck vibrates sinuously, but the head remains steady, thus enabling the bird, even at top speed, to look around with unshaken glance in any direction. The wings lie along the sides about on a level with, or a little higher than, the back, and are held loosely just free of the plunging "thigh." There is no attempt to hold them extended, or to derive any assistance from them as organs of flight. Indeed, I doubt whether the conformation of the wings permits their being held out to any extent with the edge to the front; and the front edge is thickly and heavily covered with long feathers (which are regularly plucked for the market). In fact, it may be said that the wings assume just that position along the sides which the wind would force them into when the Ostrich is running at a great pace; their position is exactly that which offers least resistance to the passing wind.

When Ostriches are startled, as by a dog; when they start away to run; or when not very hard pressed, they will often run, and very rapidly, for some distance with their wings raised nearly upright on each side of the neck; just as, under similar conditions, Springbucks will run with the white fan on their backs raised, frequently "pronking." * When the Ostrich runs thus, with its wings raised, it generally moves with a high, springy, bounding step, never with the long raking stride of the bird that, hard-pressed, is fleeing for its life. Raised wings are undoubtedly an obstacle to the greatest pace. So the Springbuck, when he stretches himself out to run his fastest, shuts down his fan, as the attitude which enables him to expand it prevents his attaining to his greatest pace. When an Ostrich, after a long run, is very tired, its wings sometimes droop; this is due to exhaustion; they are never, by a running bird exerting itself to the utmost, held out away from the sides to lighten its weight or to increase its pace. But the wings appear to be of great service in turning, enabling the bird to double abruptly even when going at top speed.

* "Pronking," the (Dutch) word used to denote the habit these Antelopes have of leaping to a great height into the air, the attitude (which expands the white fan) being almost exactly that of a bucking horse.

Nidification, Sexual Relations, and Parental Habits.

Greater misconception seems to prevail with regard to the nidification, sexual relations, and parental habits of the Ostrich than upon any other really important points connected with it.

The best comment upon the various authorities will perhaps be a simple statement of what I know to be the facts.

The Nest.

As the breeding season approaches, a cock and hen will pair, and, having selected a site congenial to their inclinations, proceed to make a nest. I believe that in all cases, in the first instance, one cock and one hen, having paired, select the site and make the nest.

In a camp, no matter how large, where there are many birds and many nests, choice of position is restricted. As they like to have their nests far apart, it is especially difficult for a pair to select a spot which shall escape the observation of other birds. This probably accounts for the fact that many sites are unwisely chosen. Generally a stony or sandy rise, however slight, is selected, often beside and partly sheltered by a small bush. The sites being selected, each cock is supreme over all other cocks at his nest and in its immediate neighbourhood.

The nest is simply a hollow depression, more or less deep according to the nature of the soil. It is made by the pair together. The cock goes down on to his breast, scraping or kicking the sand out backwards with his feet, cutting the earth with his long and powerful nails. The hen stands by, often fluttering and clicking her wings, and helps by picking up the sand with her beak, and dropping it irregularly near the edge of the growing depression.

Laying and Sitting.

When satisfied with their work (and they are easily satisfied, often too easily) the hen begins to lay an egg in the nest, every other day. During the laying period the nest is often unattended, and is not slept on at night. A nest in which only one hen is laying contains on the average about fifteen eggs; but she often begins to sit before she has laid her full complement. Sometimes she will lay four or five after beginning to sit, though not often so many; sometimes only one or two; while sometimes

she will lay her full complement. The hen generally begins the sitting; she will occasionally sit for one or two days and nights before the cock takes his turn. Now and then, however, the cock will be first to sit; but, in such a case, he will probably leave the nest for some hours during the day.

When sitting assumes its regular course, the hen sits from 8 or 9 a.m. to about 4 p.m., and the cock from 4 p.m. to about 8 or 9 a.m. The bird whose turn it is to be on the nest keeps its seat until the other arrives to relieve it, when they at once change places. Soon after beginning to sit, the cock loses his sexual vigour and inclinations, and ceases his attentions to the hen.

It is quite incorrect to say that the cock alone sits, or that during the day the eggs are left to the heat of the sun. The cock and hen sit alternately, regularly and steadily, night and day, during the whole period of incubation. Apart from incubation, it is necessary that the eggs should be covered during the day as a protection, in many parts, against small carnivora and monkeys; against the inclemencies of the weather, such as the frequent and violent hail and rain storms which sweep over the country; and against the great heat, which in the summer is almost tropical. The heat from the direct rays of the sun striking upon unprotected eggs, when, after incubation, development has once set in, is so great that it would kill them. Sand thus exposed becomes so hot that even a hardened hand can scarcely endure it. On an average summer's day I tested the heat of the sand, keeping the thermometer in the shade, and found it to be 150° Fahr. The maximum temperature allowed to eggs in an incubator is 104° Fahr., though a few degrees more, if not maintained too long, are not greatly injurious; but if the thermometer stands at 150° Fahr. for some hours daily, chicks will not incubate. However, argument is quite unnecessary; the hen sits on the eggs every day—of this there is no doubt whatever; they are not left to the heat of the sun; if they were, no chicks would ever result; they are covered by the birds during the whole period of incubation.

Times of Sitting well Apportioned.

There are several interesting points connected with the process of sitting. For instance, the time is admirably arranged

to allow each bird to feed. The Ostrich is a peculiar feeder; in the first place he walks rapidly on and on as he feeds, pecking a few leaves here and a few there in his stride, seldom halting unless he finds some plant particularly to his liking, and then only for a minute or two. In the next place, he is not an indiscriminate feeder, but carefully selects what he likes. This, as a rule, consists of plants, which, owing to the nature of the country, are few and far between. He does not, however, go systematically in search of them, but strides straight on, eating those in his way. Thus he travels long distances while feeding, and requires several consecutive hours if he is to obtain a satisfactory meal. The hen has about four or five hours to feed in the early morning before she goes on to the nest; and the cock has seven or eight consecutive hours through the day, after which the hen again has three or four hours in the evening, before she returns to sleep near the nest. Generally, the hen has a somewhat longer time to feed than the cock, but her time is broken into two portions, and she cannot wander so far in search of food as he can, and thus has not the same opportunity of getting on to new ground, where food may be more abundant, from not having been visited so often, for the Ostrich is a destructive feeder, eating out the plants he likes when he has not a sufficiently large run. In compensation, the hen occupies the nest only half as long as the cock, who, however, has his feeding time unbroken, and half his time on the nest at night. It will thus be seen that, not counting the hours at night when both are sleeping (the cock on the nest), the duties of incubation are very evenly divided.

Protective Colouration.

The colour of each is admirably adapted to the time spent on the nest, and furnish interesting examples of protective colouration. It is scarcely possible to conceive a more effective disguise than the sober brownish grey of the hen for day sitting, and the black of the cock for night. When on the nest, the Ostrich lays its head, neck, and tail flat along the ground; its naked "thighs" are covered by the wings, the plumes lying close together on the earth almost hidden against the bird's body. Thus only the low, long-curved body projects above the surrounding level. The cock, at night, is, of course, almost

perfectly hidden; while the hen, at day-time, closely resembles a stone, bush, ant-heap, or any little inequality of the veld. One is surprised to see how close such a large bird can lie to the ground, and how even an Ostrich-farmer may almost walk over a sitting hen in full daylight without seeing her. The cock is simply indistinguishable at night, except to a practised eye, and then only at a few yards distance. It may be urged that the black of the cock is not a protection in the morning or afternoon during daylight. This is not quite correct. In the very early morning, or in the afternoon towards sundown, it is most difficult to distinguish him; and it is but for two or three hours altogether that he is in the broad daylight, that being the only time in the whole twenty-four hours when the nest is not protected in a singularly effective manner by the colour of the sitting bird. Even then, unless one is close to the nest, his low-lying, long-curved, motionless form blends so closely with the ground and surrounding objects as to be much more difficult to discover than an inexperienced person could believe.

The little Embankment around the Nest.

As sitting continues, a little embankment is gradually raised around the nest, where the nature of the soil permits. This is not in the original plan of the nest, but is made during the incubation of the eggs. The sitting bird, while on the nest, sometimes pecks the sand up with its beak nearly as far from the nest as it can reach, and drops it around the body. A little embankment is thus gradually formed, and often, just outside, a shallow irregular trench, from which the soil has been taken. The formation of both is aided by a peculiar habit of the birds. When the bird on the nest is much excited (as by the approach of other birds or people), it snaps up the sand spasmodically without rising from the nest, and without lifting its head more than a few inches from the ground. The bank is raised by such sand as falls inward, and the trench is deepened.

The original nest, as has been pointed out, is merely a shallow depression, the earth scraped out being mostly scattered far and wide by the vigorous kicks of the cock. As sitting continues the depression is very liable to silt up again; this is aided by the bird scraping in sand now and then when working the

outside eggs in under the body, and by the way it seats itself on the nest. It squats at the edge, and then gradually, in a sliding manner, works itself in, until it covers the eggs, dragging in sand during the process, and thus silting up the nest. The Ostrich, being a large, heavy, long-legged bird, when about to squat, bumps with a hard jerk on to its "knees," and then gently lets its body down to the ground. So, when getting on to a nest, it carefully places its feet among the eggs, bumps down with its "knees" outside the nest, clear of the eggs, and then works itself in till the nest is covered. If this method were not pursued the eggs would be broken by the sudden and violent impact with the "knees" as the bird bumped down.

Now the use of the bank, and the reason for its gradual, continuous formation after sitting begins, are apparent; the nest is thus kept hollow. Without it the nest would be liable to silt up and the eggs roll away. That this is its use seems to be clearly shown by the fact that the nest, though hollow, is at times slightly raised above the original level. The embankment, lying close to the bird's body, also serves to carry off some of the rain that falls on the bird, as well as to partly prevent running water entering the nest.

Guarding the Nest.

The cock is very vicious and pugnacious, and will attack any bird or any person approaching the nest; at times he will chase and kick at bucks, jackals, porcupines, and other animals. If, however, a person gets right up to the nest, especially if he kneels or sits beside it, the cock seldom kicks, but puts his head down to the ground, snaps his beak spasmodically, hissing violently meanwhile, and tremulously flutters his wings (which click loudly at the largest joint) in impotent excitement and distress. But if one is only a few yards off he will kick and fight most determinedly. The reason seems obvious: if he kicks at the nest he will almost certainly break the eggs.

The hen is not vicious, and does not fight, except when she has chicks; then the habits of the cock and hen change to some extent; the cock generally runs away with the chicks (he will fight if necessary), while the hen advances to do battle.

Eggs outside the Nest.

Often, during incubation, an egg or two will be found lying outside the nest. Most authorities maintain that the birds put them out designedly, and that such eggs are used as food for the newly-hatched chicks, being broken for this purpose by the parent birds.

There is no truth in either contention. These eggs are rolled out accidentally, and if replaced will not be rejected, as I know from having frequently marked and replaced them by way of experiment. They may be quite fresh, in some stage of incubation, or rotten. There is no truth whatever in the statement that the newly-hatched chicks are fed upon them; but I have seen chicks a few days old greedily eating the dung of their parents, which often, after sitting, is in the form of small pellets. In the earlier days of Ostrich-farming I have seen little incubator-hatched chicks supplied with soft cow-dung and beaten-up Ostrich egg, but nothing of the sort is done now; they are fed with succulent green food, which is enough for all purposes. If left to nature, and allowed to run with their parents, they thrive perhaps better than under any other conditions; only they become very wild, and are liable to be killed by hawks, jackals, and other animals.

The Hatching of the Chicks.

If an egg should be broken in the nest, the old birds eat it, shell and all, as they will often do when the first chick or two hatch out. This habit has no doubt given rise to the erroneous belief, expressed by one of the authorities, that the cock breaks the chicks out—cracking the shell with his breast, shaking the chick loose, and then swallowing the membrane. The chicks hatch out unaided, and though no doubt the movements of the parent on the eggs do occasionally help to free a chick which has already pecked through and cracked the shell (as I have seen), there is no design in these movements, and no need for help.

If sitting begins after the hen has laid her full complement of eggs, naturally all fertile eggs will have sufficient time to hatch. Even if she lays one or two after beginning to sit, still all may

hatch, for often one bird will remain on the nest during the day (and of course at night) with such chicks as cannot yet stand or walk, while the other feeds close at hand with the stronger ones. Thus the full time for sitting may be, and often is, exceeded by some days, and all the sound eggs may hatch. But if the hen has laid, say, four or five after beginning to sit, it is probable that several will be left in the nest, containing large living chicks (which die in the shell), for the birds will not continue sitting for more than three or four days after the first chicks appear.

Newly-hatched Chicks.

As the time for the eggs to hatch out draws near, the birds become much excited, probably from hearing the chicks crying in the shell, or pecking at it to break themselves out (both sounds being very distinct); the excitement increases as the chicks appear.

When first hatched the chicks are perfectly helpless; the back of the head and adjoining portion of the neck are greatly swollen and out of shape, as are the legs, especially the tarsi and toes, which are puffed and jelly-like, and of a transparent-looking pinkish yellow. The eyes have a cloudy expressionless appearance. For some hours they cannot even hold up their heads; they cannot stand until at least twenty-four hours old, nor get about at all until another day older, and then only in a very rickety manner, tumbling over every few steps; nor are they quick and steady on their legs until the swelling has quite subsided. They do not seem to have much consciousness for about the first twenty-four hours, but when once they have found their legs they soon become exceedingly wild unless handled, and rapidly attain to a remarkable speed. For about the first day they eat nothing; after this they may be seen, when the sunshine is warm, sitting on the edge of the nest, just free of the parent, pecking feebly and uncertainly at small objects on the ground, or at anything within their reach. The stronger ones will gradually wander a short distance from the nest with the parent that is not sitting, and eventually all will leave it, being tended by both cock and hen.

Parents and Chicks.

When defending the nest the cock carries himself splendidly, with erect straight neck, his attitude being most imposing and defiant. But when the hen (or the cock) is advancing to protect the chicks, she comes with a rapid, shuffling stride, hissing violently, with wings fluttering at right angles to the body, flat to the front, and almost touching the ground. Often both cock and hen will run away with the chicks, but if the enemy is close the chicks, especially when very young, will scatter in all directions, and squat separately. Even when older they will squat, if hard pressed. Sometimes, to mislead the pursuer, the parents will feign injury, gradually leading him away from the little chicks. I have seen a cock fall, as if with a broken leg, several times within a couple of hundred yards.

When startled the parents emit a short sound of one note, which is a signal of alarm. When the danger is past the chicks (which when squatting lie perfectly still, blending closely with the ground, and are most difficult to discover) arise, and run about in all directions, calling with their penetrating tremulous cry. The old birds return to the neighbourhood where the little ones scattered, and gather them together again. They do not call, but their height, and their keen sight and hearing, enable them readily to find the crying, moving specks. The chicks, too, are very quick at seeing and running to their parents.

The parents know their own chicks, except when very small, and will kick and peck at others, often killing them. Adult non-breeding birds also do this, as do large chicks to very small ones.

Is the Ostrich Polygamous?

There seems to be no diversity of opinion as to the polygamy of the Ostrich. It is almost entirely on the fact (an incontestable one), that several hens frequently lay in one and the same nest, that the argument for polygamy is based.

Let us examine this fact, and endeavour to ascertain what it implies.

One cock and one hen (not one cock and several hens) having paired, select a spot, and together make the nest. When the spot is well selected, in some secluded place not easily discovered, and

where other birds are not in the habit of coming, I have known many cases, in camps containing from eighty to one hundred birds of both sexes, where the pair have kept the nest exclusively. Such a nest, unless destroyed by rains or wild animals, is almost certain to yield a large proportion of chicks. This cannot, perhaps, be said of a nest under any other conditions. If, during the laying of the eggs, or after the pair have begun to sit, other hens lay in the nest or sit on it, the yield of chicks will not be so great; there will never, as far as my experience goes, be a good yield; often there are no chicks at all. The pair frequently abandon the nest. A good yield of chicks, in proportion to the eggs laid, is seldom obtained from any nest in which more than one hen lays or broods; with two hens, a good yield may be got in proportion to the eggs actually sat upon; when there are more than two hens, a few chicks *may* hatch out, but in the great majority of cases there will be none. The chance of obtaining any yield at all lessens as the number of hens increases; with four or more hens it is almost safe to say that chicks *never* result.

Yet it is undeniable that in a camp where many Ostriches run, nests are generally shared by several hens, usually by more than two. I have known six or eight to share one nest, and have found a nest with one hundred and fifty eggs in and about it, many with from fifty to seventy; but it is very exceptional—in fact, almost unknown—for such nests to yield chicks. If it were natural for several hens to share one nest, chicks should result.

All the hens of one nest keep to that nest, each laying generally about a sitting, and then beginning to brood. If they cannot lay in the nest because it is occupied, they will not often go to another nest, but will deposit their eggs just outside their own. Each nest is owned by one cock; but I do not know, when there are several hens laying in one nest, whether they are all fertilised by the cock of that nest.

Why several Hens often Share one Nest.

Now, how is it, if the Ostrich is not polygamous, that several hens often share the same nest?

The following considerations may not quite solve the question, but serve, I think, to help towards its solution.

In a troop of young birds the sexes are about evenly balanced, and, presumably, in the wild state this balance is not much disturbed. But there probably is a preponderance of hens, even in the wild state, for, in the breeding season, the cocks fight among themselves, occasionally with fatal results. In domestication, the preponderance of hens is no doubt greater, for cocks are not only killed by kicking at each other through wire fences, thus breaking their legs, but also occasionally by people they attack. In domestication, neither all cocks nor all hens come into season ; but, as the cocks that are killed are among the most vigorous and mettlesome, the proportion also of hens that come into season is greater than that of cocks.

Unattached Hens.

When a cock is ready to breed, he pairs with one hen, and with her makes the nest. If they escape the intrusion of other hens, this state of monogamy continues, and chicks result ; if they do not, polygamy will probably take place, almost always with disastrous consequences to the nest.

Now, there are other hens in season, and being in excess of the cocks (who have already mated), they are unattached, having no cock to mate with. They surrender to any cock, and are thus fertilised. So excited and overwrought are they, that tame hens will often squat on the approach of a man. Having no nests of their own (only one case of a hen unaided making a nest has come under my observation), they lay their eggs in other hens' nests, each generally keeping to the nest she first selects ; or they drop their eggs at random about the veld, this habit no doubt helping to give rise to the old Biblical belief, persisting to the present day, that the Ostrich leaves her eggs in the sand to hatch by the heat of the sun.

Herein, I think, to a great extent lies the true explanation of the so-called association of several hens with one cock, giving rise to the idea of polygamy. The cock is polygamous, it would seem, not so much from any free choice of his own as because the hens are forced upon him.

Large Chicks mistaken for Hens.

I think that travellers have often mistaken large chicks for hens. Thus, when they see a cock and some half-dozen drab Ostriches together, at a nest or on the veld, they at once class them as cock and hens, and say they are polygamous birds, while it is more than likely that the lot consists of one pair with large chicks. I have often seen a large chick mistaken for an adult hen by men of considerable experience as Ostrich farmers. Such chicks are not easily distinguished from hens, except at close quarters by an experienced man. Andersson seems to have made this mistake, and even to have supposed that a large chick was an Ostrich of a different species. It must be remembered that Ostriches are some years reaching maturity, often not attaining their complete adult plumage till four years old. If little chicks (another year's brood) accompanied the pair with large chicks, one would be even more likely to draw a false inference.

Why no Chicks result.

When several hens lay in the same nest it frequently happens that two wish to lay at the same time. In this case, as a rule, one will lay in the nest, the other on the bare ground outside. Sometimes, however, two hens may be seen on the nest at once. Presently some of the hens will begin to sit (the cock alone sitting at night). One occupies the nest, the other broody hens lying or standing about close at hand, thus betraying its presence. When she arises, whichever of the other hens is quickest, perhaps a laying hen, takes her place. Under these conditions a great many eggs are broken both before sitting begins and afterwards. The hens do not sit by turns; there is no plan in their proceedings at all.

The laying of eggs goes on from day to day by some of the hens, even after others have ceased. The consequence of this is that *the same lot* of eggs are never in the nest together for more than a few days at a time. (This I have frequently proved by marking the eggs.) Some are rolled out, new ones are laid, or old ones are rolled in, for the nest becomes trampled almost out of shape by the traffic about it. Thus there are no chicks; the eggs become broken or addled, and the nest is eventually abandoned. Under such conditions it not infrequently happens

that the cock (and perhaps some of the hens) abandons the nest in disgust before the full period of incubation is completed. This he never does if he has only one hen and is undisturbed by other birds.

It must also be noted that chicks are attended by one cock and one hen, and that the pair will kick any birds, chicks or adults, that approach them; also that it is a common rule among Ostrich farmers to camp off special breeding birds in pairs.

Every authority that I have consulted holds that the Ostrich is polygamous, but the evidence against polygamy is very strong: a pair make the nest; the hen lays all her eggs (a full sitting) in that nest; the hatching of the eggs and the care of the chicks are shared equally by cock and hen; the cock loses his sexual vigour and ceases his attentions to the hen, soon after beginning to sit; and one hen to a nest yields the best results.

Evidences for Monogamy stronger than for Polygamy.

I do not, however, think it can be maintained that the monogamy of the Ostrich is proved absolutely, but I decidedly think that the arguments in its favour are much stronger than those in support of polygamy. That there is a thoroughly organized polygamy I do not believe. It may perhaps be said that the present state of the relation between the sexes is not quite organized; but if monogamy is not yet firmly established, I hold, at least, that the tendency is that way, and am certain that monogamy is the state most suitable to the propagation of the species, though, under certain conditions, polygamy may be resorted to.

Curious and Exceptional Relations.

Finally, it must be allowed that, while all the facts at my command point strongly to the conclusion that the Ostrich is not only often monogamous, but that monogamy is the only condition perfectly favourable to the successful hatching and rearing of young; and that all the arguments in favour of polygamy break down on examination: yet the fact remains that there are a large number of curious and exceptional circumstances connected with the nidification, sexual relations, and parental habits of Ostriches that I am not yet exactly able to account

for, either on the supposition of fully organized monogamy or polygamy. It is possible that when a larger number of careful observations have been made, and the Ostrich, both in its wild state and under domesticated conditions, has been scientifically studied, we shall find certain curious and exceptional conditions governing the nidification and sexual relations of these birds. And it is much to be desired that those especially who have opportunities of studying the Ostrich in its wild state, or of obtaining exact information from those who have had these opportunities, should carefully collect all facts, as this matter is one of much scientific interest.

ORNITHOLOGICAL RECORD FOR NORFOLK FOR 1896.

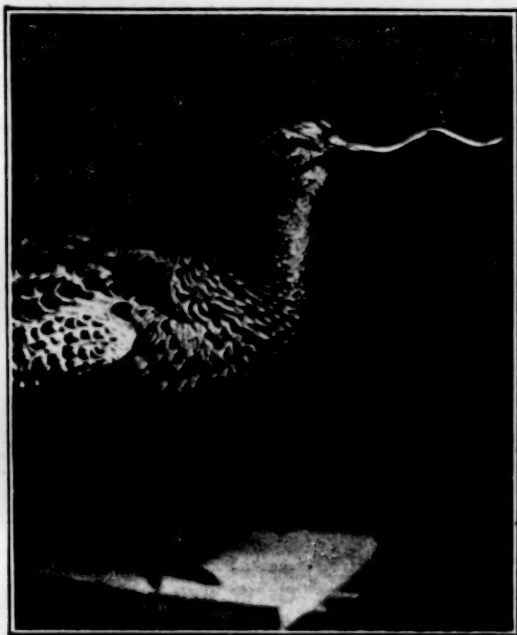
BY J. H. GURNEY.

(Assisted by Messrs. T. SOUTHWELL, M. BIRD, A. PATTERSON, and H. PASHLEY.

THE great feature of the year 1896 was the autumn migration, but before allowing myself to dwell on this absorbing topic I have a good account to render of the breeding of Terns, Waterfowl, and Game. For instance, in May three pairs of handsome Shovellers nested in a certain spot, which I will not particularise; and, better still, no less than nine pairs of Sheld-ducks were credibly reported to have brought out their young among the sand-hills. I need not copy notes about common nests, but it is interesting to hear from Mr. T. Southwell of a Cuckoo's egg in a Willow Warbler's nest, and two more were hatched off in Robins' nests. Two pairs of Stock-Doves nested in tubs which I had put up for Owls, and another laid its egg in the same oak-tree as contained a Barn Owl's nest. Young Barn Owls bred in May were still in their hollow tree, in the nest, in August, and on one occasion we found them (but this was earlier) sitting on two dead rats. They undoubtedly prefer the neighbourhood of man and his dwellings, as they are also said to do in America, and it must be solely because there are more mice and small rats there for them. At eight o'clock my Barn Owls generally went out to search for prey, and I do not believe they ever brought back a single head of game. The Rev. Maurice Bird met with a Short-eared Owl's nest containing six young, near the locality of the nest of which the late Henry Seebohm has given such a graphic description; and I am glad to say he reports that Bearded Tits did fairly well in their now limited area on our "Broads." There were two Montagu's Harriers' nests, within a few miles of one another, in the usual district, containing eggs; and four young ones, which may have come from one of these nests, were sent by Mr. Laidlay to the Zoological Gardens, two of which were more rufous than the others, and differed in size. It is doubtful if the Hen Harrier has nested in Norfolk during the last fifty years, the

supposed nests of 1861 and 1870 being in all probability Montagu's; but the latter no doubt breeds every year, or tries to do so. The Marsh Harrier has become very scarce, and there probably has not been a nest anywhere in the eastern counties since about 1885. The birds are persecuted to the death whenever seen, but happily I have not heard of a Marsh Harrier being shot this year.

Owing to the dry weather 1896 was a great breeding season for Partridges and Pheasants, but Snipe and Woodcock were very



PHEASANT SHOT AT HARLING.

scarce. Less than half an inch of rain fell in the important month of May, the returns, as taken in an open place on my lawn, being—April, '94 in.; May, '46 in.; June, 2'20 in.; July, '89 in.; August, 1'77 in. At the end of August the year's rainfall was nearly five inches deficient. All this was splendid for the Partridges, which multiplied exceedingly; so that three guns in September obtained 1005 at Hockwold in one day. Even this performance was exceeded at Houghton and Holkham, at the latter place 1117 Partridges being brought to bag by eight guns;

the birds carefully counted, and shot as late as Dec. 8th. In such a year as this the Partridge was numerically the next most abundant species to the House Sparrow in Norfolk and Suffolk; most people would put the Chaffinch third, and I should say the Sky Lark fourth; but after a great wave of Thrushes, Rooks, or Goldcrests, either of these species would be in the ascendant. If Partridges had anything of the Sand Grouse in their nature such a multiplication would cause a migratory exodus. The same causes which contributed to the plenty of Partridges gave us a rare season of Pheasants, and one plump hen was shot at Harling with the upper mandible prolonged to $3\frac{3}{4}$ in., and twisted like a corkscrew (see fig.). An ordinary Pheasant's bill is an inch, so it is extraordinary how such a growth remained unbroken. Another curious Pheasant, though not shot on the same occasion, was a hen assuming cock's plumage, combined with partial albinism, which produced an altogether motley garb.

Thanks to legislation, our Terns this year had a pretty good time, one reliable witness finding as many as one hundred eggs or small nestlings in a single day at Blakeney; and Mr. E. Ramm believes they were not much molested, except by Rooks, or, it may be, by a pair of Carrion Crows, whose presence I have long suspected there. The close-time ends rather too soon for Norfolk Terns, as on August 1st Mr. T. E. Gunn saw several eggs still lying about, and a good many young birds just leaving the nest; and on the 28th I was given a young one with down on its head. The Lesser Tern seems to leave Norfolk rather earlier than the Common Tern, and very few remain after Sept. 20th. I did not see any on the 28th, but there were several Common Terns left, and one Sandwich Tern. At the close of September, some, following the course of the river, came even as far inland as Norwich. As for the Sandwich Terns, they were again very much in evidence. Mr. H. Pashley was told by reliable fishermen that on one or two days there were actually more Sandwich than Common Terns off Stiffkey and Wells, and beautifully mottled examples were repeatedly seen at the mouth of the Glaven, in pursuit of sand-eels,—an increase which, in such a handsome species, is gratifying.

Arctic Skuas, immature and changing, were comparatively plentiful all through August, September, and October, at or near

Blakeney. Mr. Pashley stuffed one which exhibited a perfect melanism, with just an indication of straw-colour on the acuminate feathers of the neck—an old bird with a nice tail. As far as I know, not a single Pomatorhine turned up, unless a large dark Skua swimming off Cromer Pier was one; but I could not be certain. It is most unusual for a year to pass without a Pomatorhine Skua, and with only one Glaucous Gull; but ten well-identified Little Gulls were seen by different correspondents during the autumn (of which five were observed in October), and this is good as against one in 1895, and three in 1894. We ought to have plenty of Little Gulls, because they are so common in Heligoland. As if to make up for the extraordinary abundance of the Little Auk in 1894–95, the two winters since have scarcely produced any; while the Lapland Bunting, so common in 1892, has been scarcely seen. No Eagles are reported, and only two Rough-legged Buzzards, and but one Fulmar as against ten in 1895.

During the autumn of 1896 the following very rare visitors came in from over the sea:—White-winged Tern, Gull-billed Tern, Sabine's Gull, Greater Shearwater, and Aquatic Warbler, all presumably with a west wind; Icterine Warbler, Pallas's Warbler, and Red-breasted Flycatcher, presumably with an east wind; Barred Warbler, with a south wind; and Greater Spotted Cuckoo, with a north wind. These instances alone show how very much there is still to be learnt as to wind influence, and there is no better post of observation than our rounded seaboard for diligently noticing its bearing on migration. Migratory birds which come to Norfolk in autumn, flying against a west wind, as was the case with three of those here named, were not so numerous in 1896 as they have sometimes been. Such birds are undoubtedly always more in evidence than those which come across the North Sea, flying with an east wind. The reason is evident, because if the wind is with them—i. e. east or north-east—they leaving the Naze of Norway, or some more southern place, at one or two o'clock in the morning (or later in the case of the Hooded Crow and Rook), make land at Cromer, Cley, or Yarmouth before any but the earliest fishermen and shore-gunners are abroad. On the other hand, if they come across the North Sea against a west wind, and, unless it be very light indeed, there is a certain amount of labour attending the passage, which accounts for their being seen long

after daybreak, while perhaps the flight goes on all through the day. Ornithological migration on the Norfolk coast is an east to west one in autumn.

I think it may be gathered from Mr. W. E. Clarke's valuable 'Digest of the Observations on the Migrations of Birds' that the feathered pilgrims often cross England, and even go to Ireland, before they turn south. Then the direction of flight of these birds, which may have followed the sun in its course from Russia and Asia, is entirely reversed, though in one or two instances misguided Rooks and Starlings have been seen still flying westwards, even from the western coasts of Ireland.

The number of Rooks, Grey Crows, Jackdaws, and Starlings which arrive in Norfolk every autumn is very large, though nothing like the quantities which pass Heligoland (H. Gätke), and with them come regiments of small birds. Occasionally an old Crow, too hungry to wait until he gets to land, catches a Chaffinch *en route* (cf. Zool. xi. p. 4124), but generally there is harmony. This mixing up of small and great was noticed in our county as long ago as 1660, and is evident still, though there are far fewer Teal and Hawks than there were in Sir T. Browne's day. Of all months there are none for Norfolk, Suffolk, and Lincolnshire like the month of October, which brings not only the largest variety of species, but also the largest number of individuals in any period of the year. More birds pass our eight lightships in that month than in any other. Although I have had nearly seventy species, or at least their wings, from these and other lanterns, there has never been a House Sparrow among them, neither did Mr. Booth or Mr. Cordeaux ever procure one on our coast. As the past autumn was a remarkable one for migration, it was a good thing that Mr. G. Newbegin consented, at my request (stimulated by Mr. Bray's curious observations made in Surrey), to take observations of the sun and full moon at the Norwich Observatory, and he also developed several photographs in the hope of catching birds in the act of passing these luminaries; but none crossed the telescope. This is the only way in which we can establish the altitudes at which migratory birds fly, but at present nothing has passed to confirm H. Gätke's views. Nevertheless I believe them to be perfectly correct, for twenty-five years ago I had exceptional eyesight, and have occasionally, by

looking in the sky, detected large birds on our coast, two miles up, during the migratory period. If migratory birds travel at such heights, and by night, it may fairly be presumed that mountain chains and great rivers have little to do in determining their course; but this does not apply to Crows and Larks, which are seen in great numbers off Norfolk at quite a moderate altitude, and also Kestrels and Starlings. Indeed, Sky Larks may be sometimes seen flying so low over the sea that, as Gätke remarks, they almost adapt their flight to the undulations of the waves.

The past year has accorded Norfolk three novelties—the Aquatic Warbler, the Greater Spotted Cuckoo, and Pallas's Willow Warbler—which, with the Red-banded Crossbill (Supplement to the 'Birds of Europe,' and Zool. 3rd ser. vol. xiii. p. 391), bring the county list to 303. The Red-breasted Flycatcher, Icterine, and Barred Warblers are also very rare birds. The dates of the three Norfolk-killed Icterine Warblers are, in point of season, curiously close, *viz.* Sept. 11th (1884), Sept. 4th (1893), Sept. 7th (1896); and the four Norfolk Barred Warblers, Sept. 4th, Sept. 10th, Sept. 10th, and Aug. 31st. Gätke gives the former as rare in Heligoland, and the Barred Warbler as very rare, and does not mention a September occurrence of either of them. Both are found in Norway and Sweden, so there is nothing remarkable in their touching our east coast on the southward migration. Perhaps next year they will bring the Crested Titmouse with them, which has been identified in Norfolk already by two observers, Mr. Patterson and Mr. Spalding, in the former case on a small Scotch fir on the Caister road, not far from the sea.

Before beginning the diary for the year I wish to allude to another subject. I regret as much as any reader of this Journal can do, the repeated destruction of Spoonbills in the Eastern Counties which it is my lot to chronicle; but it must be conceded that the Breydon Wild Birds' Protection Society has more than justified its existence, as shown by the number of Spoonbills (besides some Avocets) which have visited this tidal broad and escaped since the appointment of our paid watcher nine years ago. In May, June, and July, 1888, thirteen Spoonbills (including six in one flock on June 3rd) came to Breydon. In the spring of 1889 our watcher saw three, and in 1891 two on June 14th, and one on the 20th which remained about, and was seen at intervals until July

31st. In 1893 there were thirteen on the broad, on April 28th, and eleven more in May and June. In 1894 the watcher saw sixteen, on May 13th; and in 1895 a flock of twelve, on May 5th, which remained until the 13th. There have been eight at least during the present year. Thus in ten springs and summers (for they seldom come after August) *eighty-four Spoonbills have visited this one Norfolk broad*, which has long been known—since 1851—to have far more attractions for this species than the mud-flats at Blakeney. Surely if our gunners would be considerate enough to let this grand bird alone, the woods of *Cauntele* (Cantley) and *Castre by Jernemuth* (Caister by Yarmouth) might rejoice in its presence again in breeding time (*cf.* Prof. Newton, *Norf. Norw. tr. vi. p. 158*). It was here probably that in the sixteenth century William Turner, dean of Wells, came to see the Cormorants and Herons building in high trees, but he says nothing about Spoonbills; however, in the seventeenth century they were still nesting at Claxton and Reedham, parishes on the Bure, five miles apart, Cantley lying between them. These places are all within a few miles of Breydon Broad, and it is impossible to resist the conviction that with adequate protection Spoonbills might return to one or other of them.

JANUARY.

1st.—A beautiful New Year's Day with which to begin the year; weather very mild, and Hawfinch on the lawn.

3rd.—A Grey Shrike caught at Davy Hill, Runton. Placed in a cage, it quickly hung up small birds and pieces of raw meat on thorns supplied it by my brother for that purpose, and then by sheer force of body and beak, for which the shape of the mandible is exactly adapted, wrenched at them, until they were torn in pieces. It lived a long time, but would eat no food at all without first tugging at it with all its might, its whole body working like a lever; it is probably solely for the purpose and facility of tugging that Shrikes impale, and not with any idea of storing up a hoard of food. With closed wings this interesting bird had only one white wing-spot, but with wings unfolded a second spot became visible. Some years ago a Grey Shrike was killed near Cromer, a very pale bird, which showed three fairly distinct white wing-spots, and was perhaps *Lanius leucopterus*,

Sev. Notes were sent me respecting five more in the autumn at Brunstead, Norwich, Shernbourne, and Heacham, probably Pallas's Shrike, which, as in Heligoland, is much the commoner of the two, *i. e.* with one white spot; but as both forms are found in the same brood ('Ibis,' 1886, p. 32), *L. excubitor* and *L. major* cannot be distinct species.

4th.—Red-necked Grebe at Cley, and Little Gull at Cromer (H. Cole).

7th.—White-fronted Goose, Black-throated Diver, and Mealy Redpoll at Blakeney. About Christmas Mr. Pashley states that a number of Mealy Redpolls frequented the sand-hills, but, on the other hand, Shore Larks were just as scarce as they were abundant in 1895.

9th.—A Great Skua shot at Eccles (T. Southwell); a fine dark specimen.

14th.—Shag at Heacham and Grey Shrike at Dersingham (R. Clarke).

17th.—A much pied Moorhen, with white back and breast and curiously dappled wings, its feathers, however, of the ordinary texture, and not hair-like, as is sometimes the case—shot at Morton (E. Roberts).

19th.—Bernicle Goose, always a rare bird with us, brought into Yarmouth (A. Patterson).

22nd.—Shag at Hillington (R. Clarke).

FEBRUARY.

10th.—A male Goldeneye shot on the river at Keswick.

11th.—Peregrine Falcon at Holkham (Lord Leicester).

17th.—Mr. A. Patterson forwarded a live Rook with perfectly complete nasal bristles, which it retained up to the time of its death in July, being probably then sixteen months old. Can this bird have been a half-breed? I see nothing wild in the supposition, knowing that Rooks have even paired with Magpies when pinioned.

22nd.—A female (domesticated) Wild Duck, which assumed the male plumage about ten years ago, died, having for several winters past acquired absolutely perfect male attire.

28th.—Three Scandinavian Rock Pipits shot at the mouth of the Glaven, but, though males, they showed very little of the

vinous breast and grey head, it being rather too early for the assumption of much colour; indeed, one of them is scarcely distinguishable from a common Rock Pipit. The last occurred in Norfolk two years ago.

MARCH.

4th.—Four Pintail on Breydon Broad (S. Chambers).

18th.—One hundred and fifty Wigeon on Breydon (S. Chambers).

24th.—Two Wheatears at Beachamwell (R. C. Nightingale); the first seen.

APRIL.

2nd.—Drake Garganey at Hickling.

18th.—A poached Shoveller and a Red-necked Grebe in Yarmouth market (Patterson).

23rd.—Shoveller Duck already sitting (M. Bird).

27th.—Several Whimbrel flying over Yarmouth at night during rain (Patterson).

MAY.

14th.—Puffin at Snettisham, and a pair of Dotterel at Docking (R. Clarke).

16th.—Osprey at Hoveton (Dr. Wheeler), and the same a few days afterwards at Filby.

JUNE.

2nd.—Spoonbill on Breydon Broad (B. Dye).

6th. Do. do. (Patterson).

7th. Do. do. (Chambers).

8th. Do. do. (Chambers).

14th.—Hawfinch's nest and four young ones at Toft-Trees (R. Drewell); one exasperated owner of green peas shot fifteen of these thieves in his garden this summer.

17th.—Four Garganey Teal on Breydon about this date (Chambers).

19th.—Five Spoonbills seen on Breydon, and two of them shot in spite of the efforts to protect them. (Several correspondents.)

20th.—A pair of Kentish Plovers at Yarmouth, identified but spared (E. Saunders).

22nd.—Six Grey Crows on Yarmouth marshes (H. Bond).

24th.—At 8 a.m., Chambers, being on the Broad, saw a

Spoonbill come in from the south, wheel round once, and then pitch. Though unmolested, and having the whole broad almost to itself, with the exception of one Grey Plover and a few Gulls and Herons, it only remained twelve hours, being last seen feeding by itself about 7.30 p.m. About the same time one, possibly the same, was seen at Cley. On the same day two Roseate Terns, both females, which may possibly have had eggs, as they have nested in Norfolk once, and not many years ago, were shot on Blakeney Bar by a lad whose youth is the only excuse for his having broken the law in killing them. These birds had coal-black heads and orange-vermilion legs, but the evanescent pink of the under parts had almost faded when they were sent to Norwich.

28th.—Grey Crow near Haddiscoe (L. Farman).

29th.—To-day the Scarlet Grosbeak, believed, if there was no miscarriage of justice (see Zool. 1893, p. 150), to have been clap-netted in South Norfolk, died, after living nearly four years. It was always a very tame bird, using its wings very little, and fond of raising the feathers on the crown of the head into an approach to a crest, as it sat sedately on its perch of wood. Gütke particularly remarks on the tameness of this species.

JULY.

13th.—Little Bittern heard at Saham Toney, where its grunting note is known.

14th.—A Golden Plover seen on the Bure by Mr. Patterson at this unusual date.

15th.—Spoonbill seen on Breydon (Patterson).

AUGUST. (Prevailing wind North).

6th.—Seven Pochards seen at Hickling (M. Bird).

10th.—A Green Sandpiper at Sprowston (R. Gurney), and the next day one in my garden at Keswick, and afterwards some at Potter Heigham and the mouth of the Glaven.

12th.—N.W. in the morning. A White-winged Tern shot on Breydon Broad. This bird, which was exhibited at the Naturalists' meeting, and is now in the collection of Mr. B. Dye, is an old male passing from its summer to its winter plumage, the nape and occiput being mottled with black, and the grey feathers of the back blotched with new black ones. The White-

winged Tern, which one is tempted to think might, like the Spoonbill, establish itself with protection, is not, oddly enough, included in Gütke's 'Birds of Heligoland.'

13th.—W. Some Manx Shearwaters seen off the beach by Mr. E. Ramm. Very few Black Terns have appeared this year.

14th.—W. A Greater Shearwater passed along the shore within eighty yards of Mr. Ramm, who was near enough to see the dark brown of the under parts.

16th.—A small flock of Tree Pipits at Keswick.

18th.—An Eared Grebe at Cley (H. Pashley), which I saw in the flesh; very rare in August.

25th.—Mr. Robert Gurney had a good view of the Greater Shearwater on the Bar, with two Manx Shearwaters. A beautiful white variety of the Sanderling, with a little buff mottling on the back, shot at Heacham, near Hunstanton; female by dissection. Much too conspicuous an object to escape.

27th.—A young Turnstone picked up near Cromer Lighthouse, and about the same time the principal, Mr. Argent, caught a Golden Plover; but little or nothing else visited the light, which revolves too quickly to attract many birds. I have, however, a few notes from lightships, to be given later on.

30th.—Wind S.

31st.—Wind S. A nice arrival of Wheatears and Whinchats on the coast, and with them a Barred Warbler and two other birds, which I think were young Bluethroats. This was within a few hundred yards of the spot where the other Barred Warblers were taken in 1884, 1888, and 1894. The grey tone of its back gave it a Shrike-like aspect, as it skulked in *Chenopodium*, and then doubled back with a somewhat slow and laboured flight. At the same time Mr. Ramm followed a peculiar Bunting, which was probably an Ortolan; so it is clear that the south wind had brought an arrival of foreigners, but I believe it was very light. Three Black-tailed Godwits were seen on Breydon, and about the same time some Spotted Redshanks (E. Saunders), and other Waders.

SEPTEMBER.

Prevailing wind S. and W. Gales on four days.

1st.—N.N.E. Mr. Pashley observed Redstarts coming off the sea, and a large arrival of Tit Larks.

2nd.—W. Manx Shearwater at Heacham (R. Clarke).

3rd.—Scarcely any wind. A Bluethroat and some Pied Flycatchers seen, and some 250 Gannets at sea (R. Gurney). Two Quails at Pulham Market (T. Southwell).

4th.—Wind W. [In Lincolnshire E., cf. Zool. 1896, p. 436, *Phylloscopus viridanus*.] Going out after dark Mr. Patterson found the weather very unsettled and wet; while from the mingled cries of Grey Plover, Godwits, Knots, and Dunlin overhead, he judged the air to be alive with birds of the wader class, probably attracted by the lights of Yarmouth. When the street-lamps are put out and daylight dawns the spell is broken.

5th.—Wind S., strong. A Gull-billed Tern almost in winter plumage—an adult bird—having the top of the head nearly white, with darker nape and a black forehead, was shot on Breydon Broad, and submitted to Mr. Southwell in the flesh. I imagine that this summer visitor, which doubtless bred in Montagu's time in England, has not been obtained in this garb before; it is certainly less of a sea-loving species than the Sandwich Tern. Mr. R. Gurney met with a Dotterel in the speckled immature plumage, and Mr. Arnold with a Grey Plover (a species which has been rather numerous) still nearly in breeding plumage. Twelve Grey Plovers and four Corncrakes on a stall at Yarmouth (Patterson).

6th.—E. A Bluethroat, a Lesser Whitethroat, and a good many Redstarts, which had probably crossed in the night, noticed by Mr. Gunn in the scrub, a few hundred yards from the sea.

7th.—E. Seven Wagtails and nine Chaffinches passed the 'Dudgeon' light-vessel, intending probably to make the shore at Wells (E. Cole, master). Mr. R. Gurney obtained an Icterine Warbler, which had probably only arrived on the beach a few hours before, as in passing the same small bushes in the morning we had not noticed it there. Length $5\frac{1}{4}$ in. to tip of beak; weight $\frac{1}{2}$ oz. Feet and legs greyish lead colour. Upper mandible horn-colour, lower mandible yellow. The bushes contained a good many Garden Warblers, young Whinchats and Whitethroats, and one Bluethroat, which, like the other two, was a young bird with a white gorget encircled with slate colour. This Bluethroat and the Icterine Warbler had come in with the wind, and perhaps crossed the sea together, as they were only about one hundred yards apart.

8th.—*Convolvulus* Hawk Moth caught on 'The Cockle' light-vessel (forwarded). Wind S.S.W. Several Tree Pipits among the sand-hills (Gunn), where an adult Bluethroat in change of plumage was killed. A flock of nine Ruffs seen at 'The Eye' (Pashley), and two more shot at Lynn (R. Clarke). I think it may be considered that with such waders as Ruffs, Dunlins, Plovers, Knots, and Turnstones the proportion of adults to young is about one to nine in September and October at Cley. The young birds lead the way, while the old ones may be the same which, according to Collett, summer at the most southern point of Norway (Journ. für Orn., July 1881), from whence they would soon flit across to Cley; but this is a subject for enquiry, though not an easy one to pursue.

9th.—S.S.W., rather strong. An Aquatic Warbler, *Acrocephalus aquaticus*, Gm., in immature but very good plumage, with the lines on the back more pronounced than the streak of buff on the crown, shot at the foot of Blakeney sand-hills by Mr. Gunn, was a male, and contained the remains of earwigs and a beetle, no doubt foraged in the *Chenopodium* bushes. It is the fifth for England, and is a good deal like one shot by Mr. Edward Hart, at Christchurch in Hampshire. Mr. Gunn saw a few Sedge Warblers at the same time, with which it had probably come from Denmark, where Saunders says it breeds sparingly. Thirteen Chaffinches, a large Hawk, and a Death's-head Moth passed the 'Dudgeon' floating light. The caterpillars of the Death's-head had been more plentiful than for many years, and I see in the 'Field' that they were similarly abundant in Yorkshire.*

11th.—Honey Buzzard shot at Snettisham (R. Clarke).

14th.—W. A White-headed Honey Buzzard, with chest and under parts of the same colour, and dappled wings, shot at Southrepps. This beautiful albinistic variety has occurred two or three times before in Norfolk, and one of them, just like the present example, is figured in Dresser's 'Birds of Europe.' About this time a sprinkling of Kestrels came in from the sea, going in nearly every case against the wind, some of them taking exactly the same line their predecessors followed in other years.

* Also elsewhere, and similarly reported from Berks, Brecknock, Cambridge, Cheshire, Devon, Essex, Kent, Lancashire, Lincolnshire, &c. (Ed.)

15th.—Wind W., moderate. Between 7 a.m. and 9 a.m. a good many flocks of Sky Larks, mingled with a few Tit Larks, Wheatears, and Wagtails, were seen coming off the sea at Overstrand, apparently flying due west, *i. e.* against the wind, which direction was changed to north-west when they made land. They then followed the course of the cliff, rounding the highest hills, and frequently resting as if tired. The flocks kept by themselves, and each averaged about thirty-five larks. This movement had probably been going on several days before it was noticed.

16th.—W., moderate. More flocks of Sky Larks passing in the morning along the cliff in a north-westerly direction.

17th.—W. Larks passing as before against the wind. Hoopoe at Caister (B. Dye).

18th.—Grey Phalarope on New Buckenham Common (J. Cole). Hoopoe at Brandon (W. Howlett).

21st.—Hoopoe at Southrepps (H. Cole).

22nd.—Between 7.40 a.m. and 8.15 a.m. at least 1500 House Martins passed Overstrand, going S.S.E., all of them close under the lee of the cliff, where they were sheltered from the wind, which was north. Between 8.15 and 8.30 more than half of them came back again in an almost continuous straggling flock. The wind was very light, but at 12.30 a storm arose, which may have been the cause of these feathered barometers being so extraordinarily restless.

28th.—A walk through the bushes at Cley revealed no birds (wind W.N.W., moderate); but in the course of the day a Red-necked Phalarope and a Red-necked Grebe were brought in to Mr. Pashley's establishment, and a boy on the muds got a Sandwich Tern. Not a single Thrush in the scrub, which, at the end of October, is sometimes packed with them.

OCTOBER. (Prevailing wind South-west.)

1st.—Immature female Little Bittern shot on Horsey Broad (E. Daily Press).

5th.—Fork-tailed Petrel on Breydon (Sir S. Crossley).

12th.—N. A Sabine's Gull, in the same state of plumage as those shot in Wales, and possibly a remnant of that flock, killed at Cley (H. Pashley). October is always the month in which it

comes to Norfolk (see Col. Feilden's remarks, Norf. Norw. tr. v. p. 421).

18th.—A Greater Spotted Cuckoo, *Coccyzus glandarius*, immature, with dark crown, rich buff chest, and very little crest, shot between Caister and Yarmouth golf-house. This bird (minus its tail, which was unfortunately scattered to the winds) was bought by Mr. E. C. Saunders, who forwarded the body. It was a male, with single-notched sternum, and with a simple projecting manubrium, very like our Common Cuckoo. The gizzard and œsophagus, which seemed very dilatable, contained fragments of black insects with yellow lines upon them, identified, after some trouble, by Messrs. R. McLachlan and C. O. Waterhouse as the larvæ of *Pygæra bucephala*, the Buff-tip Moth. This Cuckoo had probably come over the day before, when the wind was from the north, and most likely from the same place as the Macqueen's Bustard which was shot at Humber-mouth (also on the 18th), and perhaps from the Don or Volga. Or both of them may have come on the 16th, when there was wind amounting to a gale from the north-east, and this latter supposition is the more probable; while the Courser shot in Jersey on the 19th may have been of the party, in which case it is probably *Cursorius bogolubovi*, subspecies. There was a rush at Flamborough Head lighthouse on the night of the 16th, continuing to 4 a.m. on the 17th ('Naturalist,' 1897, p. 13).

19th.—Sclavonian Grebe at Yarmouth (E. Saunders). Numbers of Robins on the coast (Gunn); about this time there were thousands at Spurn Point (J. Cordeaux).

20th.—Mr. H. Pashley received a Black Redstart.

22nd.—N.W. Wood Lark and Shore Larks seen near Cley. Six Goldcrests on board 'The Cockle' light-vessel (Johnson).

23rd.—Two Velvet Scoters seen at sea by Mr. Gunn.

25th.—Grey Phalarope in a dyke quite in the town of Yarmouth (E. Saunders).

27th.—W. Goldcrests, Starlings, and Sky Larks passed 'The Cockle' light-vessel, going west; fifty Scoters going east (J. H. Johnson).

30th.—N.W. in the early morning, afterwards N. to N.E.

31st.—N.E. Mr. E. Ramm shot a very small bird, as recorded by Mr. Southwell (Zool. p. 8), which, from the exact

description in Gätke's 'Birds of Heligoland,' pp. 294, 295, was soon identified as Pallas's Willow Warbler, *Phylloscopus proregulus*, Pall. For other synonyms see 'Catalogue of Birds in



PALLAS'S WILLOW WARBLER, *Phylloscopus proregulus*.

B. M.' v. p. 71. The Norfolk Pallas's Warbler is a little smaller than the Yellow-browed Warbler, *P. superciliosus*. Its upper parts are a rather purer olive-green, and the yellow markings of the head and neck are considerably richer, especially the eye-streaks, and a rather broad stripe extending across the crown of the head to the nape of the neck. The bands on the wings are a

little broader, but they only reach half-way to the outer edge of the wing, and across the rump there is a band of lemon-yellow. Mr. Pashley jotted down the soft parts while they were fresh as follows:—Upper mandible dark brown, lower orange nearly to the tip; legs brown, feet yellowish. Length, $3\frac{3}{4}$ in. barely. Sex female. Through Mr. Dresser's kindness I am able to give a representation, the size of life, from a drawing prepared for the 'Birds of Europe,' Supp.

In October a perfectly white Long-tailed Titmouse was sent to Mr. W. Howlett, and about the 31st a yellowish-buff variety of the Woodcock was killed at Northrepps, which had the tips of the primaries white.

NOVEMBER. (Prevailing wind N.E.)

1st.—E. As soon as it was light Mr. Johnson, the master of 'The Cockle' lightship, noticed Sky Larks, Thrushes, Starlings, Snow Buntings, Linnets, and Chaffinches going west, the wind being east. From 8 p.m. to midnight, overcast with rain, a quantity of Larks, Linnets, and Chaffinches were flying round the lantern of the vessel; many of them striking it, and falling overboard, were lost.

2nd.—N.E. Larks, Starlings, Rooks, and Crows passing 'The Cockle.'

9th.—A Black-breasted Dipper shot on the river Bure (B. Dye).

11th.—Buzzard at Rollesby (E. Saunders).

12th.—Snow Buntings pretty numerous; seen by Mr. Patterson feeding on the seeds of the Michaelmas daisy.

20th.—Thousands of Lapwings near Haddiscoe, mingled with Golden Plover (L. Farman).

24th.—A Spotted Crake and many Water Rails at Heigham Sounds, as I learn from the Rev. M. C. Bird, who adds that two Coot-shooting parties, one of twelve boats and one of fifteen, on this water and Hickling, obtained 203 Coots on one day and 221 on another.

DECEMBER.

3rd.—Two Waxwings at Worstead, and a little later two on a tall thorn-hedge at Cromer (H. Winter). A nearly white Wren at Hickling (Bird).

10th.—W. and S. A young female Red-breasted Flycatcher,

another rarity from the east, and rather unexpected so late in the year, was shot off a tree on the edge of Rollesby Broad by Mr. Connop's keeper. Another was seen in September by a good observer near the sea, which makes four for Norfolk.

Three examples of the chestnut-red variety of the Partridge, *Perdix montana*, Briss.,—one of the most curious varieties in ornithology,—was shot near Dereham, this month, and another seen (fig. 'Field,' Feb. 13th, 1897); its first appearance in Norfolk.

O B I T U A R Y.

HEINRICH GÄTKE.

OF those ornithologists who have lately passed away there is none who has done better and truer work than Heinrich Gätke, who died peacefully on the island of Heligoland on January 1st last, at the patriarchal age of nearly eighty-four.

Born at Pritzwalk, Mark Brandenburg, on May 19th, 1813, Mr. Gätke, after getting what little schooling was there available, started in life as an artist, marine painting being the branch in which he took the greatest interest. At the age of twenty-three he visited Heligoland for the purpose of making studies, and, meeting there with a congenial helpmate, he married and settled on the island, and was from then resident until his death.

He was even then deeply interested in ornithology, for he at once commenced collecting specimens and making those careful notes on the migration of birds which he continued with the greatest patience and accuracy during a period of nearly sixty years. Essentially an observer and open-air naturalist, he worked year after year, amassing the rich collection of mounted birds which has of recent years become so widely known, and collecting valuable notes, which were entered in his journal with the greatest regularity. He lived a quiet, retired life, gaining his living by his pencil and brush, not publishing the result of his labours until comparatively recently; for his 'Vogelwarte Helgoland' was not issued until 1890, and then only owing to the assistance of Professor Rudolf Blasius, of Brunswick, whose father, the well-known ornithologist, Professor Johann Heinrich Blasius, visited Mr. Gätke in 1853, and was one of the first to call attention to the extent of his labours and the accuracy of his observations.

Various opinions of the deductions and arguments propounded by Mr. Gätke have been expressed by different ornithologists, but with these we will not deal here. Suffice to say that no one has found any reason to question his extreme accuracy, and there is

no doubt that he has made the island the first ornithological observatory in Europe. Almost every inhabitant was trained by him to observe and note the coming and going of the various species which visit that island during the seasons of passage, and almost every rare or unknown bird was brought to him for identification.

Of very tall and commanding presence, with flowing hair and beard (he reminded one always of what one pictured King Lear to have been), Gätke possessed an extremely genial and pleasant manner, and was a most entertaining companion. Always ready to impart information, he placed his notes most unreservedly at the disposal of any ornithologist who visited the island; and it is well known that the various articles on migration published by the late Mr. Henry Seebohm were based almost entirely on data obtained during his visit to Heligoland from the note-books of Mr. Gätke.

The writer some years ago spent a fortnight on the island with Mr. Gätke, and can testify to his extreme anxiety to render the visit of a fellow-ornithologist as pleasant and instructive as possible; and a more home-like, happy circle than that in his house would be difficult to find. Although of German origin, he spoke and wrote English like an Englishman, and was in some respects even more English than German.

Those who have known and learnt to appreciate his sterling worth will grieve deeply for him; but though he has gone his work remains, and his 'Vogelwarte Helgoland' will stand as a monument of industry and careful observation, carried on during a long and useful life. His intellect remained unimpaired to the last few days, and his end was a most peaceful one, carefully tended as he was by his devoted family.

H. E. DRESSER.

NOTES AND QUERIES.

MAMMALIA.

CHIROPTERA.

The Serotine near Hastings.—On September 3rd an example of the Serotine, *Vesperugo serotinus*, was sent to me. A few days previously I had noticed three bats leave an outhouse belonging to one of the farms on Mr. W. Lucas-Shadwell's estate, and I asked a farm hand to endeavour to capture one and send it to me that I might determine the species. The animal was killed with a hop-pole; the man seems to have been afraid to take it alive as I desired him to do. A figure of the Serotine, from the graceful pencil of Mr. G. E. Lodge, may be seen in 'The Zoologist' for 1891, pl. I., facing page 201.—W. RUSKIN BUTTERFIELD (10, Stanhope Place, St. Leonard's).

CARNIVORA.

Marten in the County Waterford.—The year before last I chronicled, in these pages (Zool. 1895, p. 301), the occurrence of two specimens, male and female, of *Martes sylvatica* in this neighbourhood. I have again to mention the capture, on December 1st, last year, of a fine male specimen of the same species. It was taken in a rabbit-trap. It measured from tip of snout to end of tail, 26 inches; same measurement to end of tail-hairs, 30 inches; length of body, 17 inches; length of tail, $8\frac{1}{2}$ inches. It weighed 3 lbs. $2\frac{1}{4}$ oz. Throat yellow, with small brown spot.—WILLIAM W. FLEMING (Coolfin, Portlaw, Co. Waterford).

The Grey Seal in Carnarvonshire.—In July, 1895, I found an example of this species, *Halichoerus gryphus*, between seven and eight feet long, on the beach near Afonwen. It had apparently been dead for some time, and much of the carcass had been devoured by crows and gulls.—G. H. CATON HAIGH (Grainsby Hall, Great Grimsby).

RODENTIA.

Bank Vole in Jersey.—I have pleasure in confirming Mr. Barrett-Hamilton's record of the Bank Vole from Jersey (Zool. 1896, p. 98). Four specimens were trapped on that island by Mr. D. Francis last August, and these have been shown to me. I have not yet had an opportunity of examining and comparing them carefully, but from the impression left on my mind I should hesitate to describe them as "perfectly typical examples," although without comparing them I cannot say wherein the differences (if there be any) lie.—W. RUSKIN BUTTERFIELD (10, Stanhope Place, St. Leonard's).

CETACEA.

The Common Rorqual on Lincolnshire Coast.—An example of the Common Rorqual, *Balanoptera musculus*, came ashore at North Cotes on Nov. 2nd, 1896. It was first seen by a Grimsby fishing-smack in a dead or dying condition floating in the North Sea and towed into the Humber by means of a hawser attached to its tail. Before, however, it reached Great Grimsby the tail came off, with the result that the carcass went ashore as above stated. The animal measured about forty feet in length.—G. H. CATON HAIGH (Grainsby Hall, Great Grimsby).

Correction.—Mr. T. Southwell desires to correct a local and a vessel's name in his "Notes on the Seal and Whale Fishery, 1896":—p. 58, line 4, for Fogs Head read Fogo Head; line 14 from foot, for 'Arctic' read 'Active.'

AVES.

Yellow-billed Cuckoo in the Isle of Wight.—In 'The Zoologist' for 1896 (p. 473) I mentioned the reported occurrence of *Coccyzus americanus* at Ventnor in October. I have since, through the kindness of Mr. Smith, at Newport, and Mr. Kent, at Ventnor, been able to verify this report. Mr. Smith writes:—"I beg to say there is no doubt whatever as to the proper identification of the Yellow-billed Cuckoo; it was found dead at a cottage-door by Mr. Kent, of Old Park, Ventnor, who may let you see it if you still have a doubt." Answering my letter asking for particulars, Mr. Kent writes:—"I picked up the bird early in October, 1896. It was lying in the pathway outside my door. The place is in an exposed situation, and about 400 yards from the sea facing west. There had been a storm and strong winds from the west, and most probably the bird was drifted here by the force of the wind coming across the sea. It could not have been dead more than an hour or so, as it was in a perfect state of preservation, and an hour previous was not in the place where I found it. The bird is an adult male." I have not actually heard of the occurrence of this bird in the Isle of Wight before, but several instances of its appearance in Devonshire and other counties on that coast are known.—G. W. SMITH (College, Winchester).

Egg of South African Golden Cuckoo in Nest of Cape Wagtail.—For some four years past a pair of Cape Wagtails, *Motacilla capensis*, have nested in the shrubs in my garden, and have generally succeeded in rearing a fairly large family during the season. They are so tame as to come within a couple of yards of the observer when in search of the insects upon which they feed. This season they have nested in a hedge consisting of roses and pomegranates, and have been somewhat seriously imposed upon. A female Golden Cuckoo, *Chrysococcyx cupreus*, has deposited an egg in the

nest of the Wagtails, with the result that a very sturdy young Cuckoo has monopolized the space usually occupied by some four Wagtails, and has secured for himself the nutriment which should have been divided amongst the whole family. The bird in question is so far advanced as to have left its borrowed home, and may daily be seen with gaping mouth awaiting the visits of its foster-parents, whose energy is somewhat severely taxed in supplying the wants of their giant offspring, whom they doubtless regard as a very undesirable boarder.—F. G. NICHOLSON (Pretoria, Transvaal, January, 1897).

[The nest of the Cape Wagtail is usually found in wall-crevices, banks, crannies of rock, or in some creeping vegetation on a wall or tree. Mr. Nicholson now records it as found in garden shrubs, and I have seen it in thorn-bushes on the veld. Mrs. Barber has stated that the Golden Cuckoos lay pure white eggs in the nests of the Cape Bunting, *Fringillaria capensis* (*F. vittata*, Lay.) and all the *Nectariniæ* (Sun-birds). Mr. Jackson found pure white eggs—which have been considered to belong to this Cuckoo—in nests of the Rufous-chested Weaver-bird, *Hyphantornis capitalis*.—ED.]

Unusually large number of Pintails in Co. Mayo.—The unusually large numbers of Pintails visiting the estuary this season is very remarkable, when the mildness of the weather is considered, and except during the hard frost of January, 1881, when the mercury fell to 7° on the night of the 15th, I have never seen their numbers equalled. We usually have a little family party of twelve to fifteen birds regularly visiting the sands in company of Wigeon every winter; but last month a flock of eighty birds was seen by Capt. Kirkwood, of Bartragh, feeding in a sandy bay within sight of his parlour-windows, and I have myself on several occasions counted upwards of fifty feeding together. It would be interesting to learn if there has been an unusually large migration to other parts of the coast this season.—ROBERT WARREN (Moyview, Ballina, Feb. 6th, 1897).

Green Sandpiper in Co. Waterford.—Two specimens of this species were shot in Curraghmore on the 23rd and 25th November last year. They frequented the sides of the pond, and were very wild. Mr. E. Williams, who is mounting them for me, says that the contents of the stomach of both birds were in such a soft and liquid state that it was impossible to know on what they had been feeding. Thompson states, on the authority of the late Dr. R. J. Burkitt, that "the Green Sandpiper is very rarely seen near Waterford." My friend Mr. Ussher informs me that he has shot it on three occasions in the county.—WILLIAM W. FLEMYNG (Coolfin, Portlaw, Co. Waterford).

Vultures and the Towers of Silence.—In connection with the bubonic plague now decimating certain parts of India, the following facts, communicated

to me by a friend out there, may be of interest, as showing that the supply of Vultures is equal to the demand at these well-known Parsee institutions:—
 “An unfounded report gained currency some days ago that the Parsee deaths from the pestilence having increased considerably, the Vultures kept at the Towers of Silence were unable to dispose of all the dead bodies exposed there. The secretary of the Parsee Punchayet Funds made personal enquiries into the matter, and has published an authoritative contradiction of the report, from which it appears that in the Tower of Silence known as Kappis Khao's there is ample space for 237 corpses, which are chiefly those of Shenshahi Parsees. In the Banajee Tower of Silence there is space for an equal number of dead bodies, chiefly those of Iranees and Kadmee Parsees, while there is no objection to Shenshahi corpses being laid therein. There is also space enough in the Anjuman and Manockjee Sett's Towers of Silence for 262 and 141 corpses respectively. The Mody Tower of Silence is used only for members of the Mody family. During the last fortnight (first half of January, 1897) about 150 dead bodies were consigned to the towers, most of them in the Kappis Khao Tower, while the corpses of Iranees and Kadmee Parsees were laid in the towers kept apart for them. According to the testimony of the corpse-bearers who enter the towers, the appearances in them were in no way different from their normal state, while the Vultures were sufficiently numerous to respond to the extra demand made upon them. According to an exact calculation made, the Vultures sitting on the walls of one tower were found to number 195, exclusive of the large number of other birds perching on the walls of the several other towers and on the trees. While the former number of Vultures was 250, there are now over 400 waiting daily at the towers.”—
 OXLEY GRABHAM (Flaxton, York).

Ornithological Folk-Lore.—In Mr. P. Ralfe's interesting paper on Manx Bird-names (p. 71) mention is made of the Wheatear and Swallow as two of the “Seven Sleepers.” Could he tell us what the other five birds were which indulged in supposed hibernation? On the Dorset coast I was told that the Wheatear was one of the seven sleepers, and was always visible at Portland on the first foggy day in March. Referring to my note-book, I find that the following eleven birds have been given me in various places as representatives of the lethargic heptarchy, the Wheatear always being included, and generally heading the list of every combination, probably in consequence of its early migration and conspicuousness on the coast, where more notice is taken of birds than is the case inland. I have found the first-named seven to be the most frequently mentioned:—Wheatear, Swallow, Sand Martin, Martin, Swift, Cuckoo, Landrail, Spotted Flycatcher, Nightjar, Wryneck, and Nightingale.—
 M. C. H. BIRD (Brunstead Rectory, Norwich).

EDITORIAL GLEANINGS.

At a recent meeting of the Bradford Scientific Society, as reported in the 'Yorkshire Weekly Post,' Mr. W. E. Preston read a paper dealing with the prehistoric remains to be found on Rombald's Moor. After describing generally the various classes of antiquities of prehistoric date to be found on the moors, Mr. Preston alluded to a nearly obliterated circle which he noticed in 1892 on Rivvock Edge, overlooking Keighley. The diameter was about sixty yards, and the wall of the circle was composed of loose stones and earth. In the centre was a large rock covered with peat and heather. On examination of a small portion which was exposed, this rock proved to be inscribed with a number of small and rather indistinct cup and ring marks. This aroused curiosity, and on removing the peat the whole surface of the rock proved to be covered with such markings. This was perhaps the only case in which an inscribed rock had been found enclosed within a circle on the Yorkshire moors. Of this rock Mr. Preston exhibited photographs; and speaking of flint implements, he described the places on the moors in which the searcher after these antiquities was most likely to meet with reward, and showed a very large and valuable collection which had been the result of his own researches.

DURING a recent scientific excursion made by the 'Princesse-Alice' in the neighbourhood of the Azores, a Sperm Whale was captured, which has proved material for a communication to the 'Bulletin du Muséum d'histoire naturelle,' by S. A. S. Le Prince Albert de Monaco, entitled "Notes sur un Cachalot." This animal, which attained a length of "13 m. 70," afforded considerable information as to the parasites which infest Cetaceans. The author describes its stomach as containing a considerable number of worms resembling Nematoids, in the "tube digestif" many "Helminthes"; in the blubber were found some Cysticeri, whilst *Cyamidæ* were scattered on the epidermis.

In vol. iii. of 'Novitates Zoologicæ,' recently completed, Mr. C. W. Andrews, F.G.S., has contributed two parts of a memoir "On the Extinct Birds of the Chatham Islands." This is the result of the examination, in the Rothschild Museum at Tring, of "an immense collection of bird remains from the Chatham Islands," consisting of many thousands of bones, mostly in good condition, and including numerous skulls and other portions

of the skeleton of *Diaphorapteryx*. In addition to the isolated bones, there are one or two more or less complete skeletons which are of great value for purposes of determination. The great bulk of the collection consists of remains of recent sea-birds, such as Albatrosses, Cormorants, and Penguins; but, in addition to *Diaphorapteryx*, there are many other extinct forms, including some large species of *Fulicia*?, *Cabalus dieffenbachii*, *Palæocorax moriorum*, and also a few seal-bones, some human metapodials and phalanges, remains of rats and mice, and of fish; but Mr. Andrews has "not found any reptilian bones whatever."

WE are glad to see from the 'Bulawayo Chronicle' that the inhabitants of Rhodesia are taking steps to mitigate the Locust scourge in their country. "The Civil Commissioner has made application to the Agricultural Department of the Cape Colony for a supply of the Locust-disease fungus which is supposed to be very effective in destroying the pest. The Principal of the Bacteriological Institute of Grahamstown has been instructed to forward a few tubes when supply is available. On arrival the Civil Commissioner proposes to hand them over to some enterprising farmers for experimenting with." Some time ago a lady in Natal recorded in 'Natural Science' the destructive effect on Locusts of this fungoid growth in her locality. The present Editor also bore witness in the same journal to similar observations made in Pretoria.

In the Transvaal, however, members of the Raad have enunciated the opinion that it is impious to seek to destroy Locusts, which are a scourge sent by the Almighty.

The disease-fungus is not the only natural enemy to the Locust. A correspondent has been recently writing about these insects in 'South Africa.' He describes their most formidable enemies in the Orange Free State as those well-known birds the Black-winged Pratincole, *Glareola melanoptera*, the White Stork, *Ciconia alba*, the Wattled Starling, *Dilophus carunculatus*, and the Lesser Kestrel, *Cerchneis tinnunculoides*. Among parasitic insects which attack the Locusts two have been recorded by Mrs. Barber. One has been described by Mr. Trimen as "a two-winged insect of the genus *Tachina*, which is of the same family (*Muscidae*) as the common house fly, and not unlike it in appearance."

This correspondent adds:—"It has been discovered lately that salted Locusts form a wholesome and nutritious diet for horses, horned cattle, pigs, poultry, &c."

IN last month's 'Ann. & Mag. Nat. Hist.,' Mr. E. E. Austen has given a translation of Prof. F. O. Guldberg's lecture before the Biological Society of Christiania, "On movement in a circle as the fundamental form of movement in animals: its cause, manifestation, and significance."

"The majority of those who are accustomed to walk in the fields and woods with open eyes for the observation of animal life have surely been struck by the readiness with which animals belonging to the same family or community find each other again, after having separated voluntarily or under compulsion. Indeed, even newly-hatched or new-born young, which one surely cannot easily suspect of having a fully developed memory for places or any acquaintance with the locality, and as to which it is quite impossible to imagine that they are already in possession of the full use of their senses, nevertheless again discover, apparently with the greatest ease, their parents, brothers and sisters, or companions, even when they have been separated from them for so long a time or by so great a distance that their sensory powers are inadequate to bring them into direct communication one with another."

The lecturer then alluded to what he provisionally termed *biological circles* or *circular wanderings*, which he traced among vertebrates, including mankind, and among insects, by which *they return to the spot where they were separated*. This, he remarks, must be of *fundamental importance* for the *maintenance of life* and the development of the individuals affected: it is, he remarks, "*universally distributed—it is one of the general laws.*"

It must be emphasised that Prof. Guldberg distinctly repudiates any connection of his circular movement with the *manège*-movement known in physiology in the case of brain-lesion.

At the Conference of Delegates of the Corresponding Societies of the British Association, Liverpool, 1896, perhaps the most original paper read was one by Mr. W. M. Flinders Petrie, "On a Federal Staff for Local Museums."

The author advocated the formation of "a federal staff to circulate for all purposes requiring skilled knowledge, leaving the permanent attention to each place to devolve on a mere caretaker." By this arrangement "each museum would have a week of attention in the year from a geologist, and the same from a zoologist and an archæologist."

The duties of such a staff would be to arrange and label the new specimens acquired in the past year, taking sometimes a day, or perhaps a fortnight, at one place; to advise on alterations and improvements; to recommend purchases required to fill up gaps; to note duplicates and promote exchanges between museums; and to deliver a lecture on the principal novelties of their own subject in the past year.

"The effect at the country museums would be that three times in the year a visitant would arrive for one of the three sections, would work everything up to date, stir the local interest by advice and a lecture, stimulate the caretaker, and arrange routine work that could be carried out

before the next year's visit, and yet would not cost more than having down three lecturers for the local institution or society, apart from this work."

MR. J. E. S. MOORE, of the Royal College of Science, London, has recently been investigating the African Lake Fauna. In a recent number of 'Nature' it was announced that he had made the apparent discovery of dimorphism in the Tanganyika medusa, with active budding in both forms. Further interesting particulars have been extracted from the 'Central African Gazette,' published at Zomba.

"Mr. Moore verified the report, which travellers on Tanganyika have heard from time to time, that there is a large fish in the lake which rushes at the paddles of a canoe passing through the water. He actually saw this take place. He also discovered a large electric fish which gives a severe shock on being touched. Tanganyika, indeed, appears to be full of fish. By trailing a line with an artificial minnow behind the boat, Mr. Moore caught enormous numbers of fish, some of them up to sixty pounds in weight—bright clean fish with silvery scales. The heaviest fish which was seen in the lake weighed over ninety pounds; this was a sort of mud-fish. Sponges were also discovered in Tanganyika, which though of no great size were undoubtedly real sponges. On the east side of the lake, in a bay where the striped leech was very common, Mr. Moore found a small fish about the size of a small minnow, whose back was striped in imitation of the leech, and this seemed to protect it against the raids of the kingfishers, which, while constantly picking up other small fish, avoided this particular one."

At a January meeting of the "Caradoc and Severn Valley Field Club," as reported in the 'Shrewsbury Chronicle,' Mr. H. E. Forrest exhibited, on behalf of Mr. Harold Peake, of Ellesmere, three young Vipers, which were taken out of the parent, and remarkable for each having two small legs. These were believed to be unique, and as probably an instance of "reversion to an ancestral type." We are indebted to Mr. R. H. Ramsbotham for the above cutting, and that gentleman writes that he had an opportunity of examining the three young Vipers referred to preserved in spirit—"said to be part of seven taken from a female Viper before birth, and which distinctly exhibited two small feet protruding from the lower portion of the belly."

